

X. Toff
Foreword by Herbert Léonard

Forked ghosts

**TWIN-BOOM aircraft PROJECTS
designed in 1939-1945**



Presentation

While the famous Lightning is featuring the twin-boom layout in all Aviation encyclopaedias, the other twin-boom airplanes of its time are much less known, in spite of interesting originalities: many among them are giant seaplanes, flying cars, asymmetrical planes...

190 personal sketches present this virtual universe where all the planes would have been "forked". Employing an innovative technique of computer drawing, this work shows a crowd of aberrant or cancelled projects, having not taken part in the war of those days. The historical angle is approached only in appendices, in a heretic way. Based on illustrations without weapon nor roundel, and very unorthodox arguments, this unusual book provides disconcerting tracks for reflection.

Situation

This work, at last very incomplete, was followed by a "Supplement n°1" (Editions 'La Plume du Temps') then of a final booklet "The end of Forked Ghosts", put freely on line for home printing. Later additions are simply announced by links on the site for downloading these books - if the 1st and 3rd volumes, free, have interested you, you would be kind buying the 2nd: there are no royalties for the author, and this edition by a pensioner does not aim at making profit, only hoping not to be heavily overdrawn.

'Forked Ghosts' / "Fantômes fourchus" :

Christophe Meunier,	Apr.1998	(author-printing)
La Plume du Temps,	Oct.2000	(published)
Christophe Meunier,	Aug.2005	(sold out, in line freely)
Christophe Meunier,	Nov.2005	(first English translation, in line freely)
Barry S. ?	2006 ?	(future checked/corrected English translation, in line freely)

Foreword

"Forked Ghosts" is not a book written by a professional. It is the work of a simple bibliophile, as there are many among the "fanatics of the heavier than air". One of those, often unknown, that do not work in the aviation world while dedicating to it much time and attentions, in research of all kinds, in erudite calculations, in meticulous and, often, judicious descriptions.

It is a book which may be described as "iconoclast, imagined, written and illustrated by an iconoclast". This remark is not pejorative, because the covered subject turns away from ordinary paths, not only because so far nobody had still truly been concerned to join together within the same work so many of these not very conventional planes that are the twin-boomers and related, but also because the method of investigation is rather "heretic". "What? Projects? From 1939 to 1945 only? And the others! And the true ones! There were so numerous!" the purists will say, having always read too concrete works, full of photographs, and they will perhaps frown initially, then advise against this book.

I feel different. I am myself a dilettante being impassioned and specialized in a narrow aeronautical field. I know the amount of research to produce such a book, which contains many enthralling things to discover. Unusual terms, international comparisons about the same layout, three-dimensional views from a computer displaying silhouettes among which many never had the honor to appear in a book, even a simple magazine. For those who know actually among twin-boomers only the most famous, the American fighter P-38 "Lightning", this work will make discover the multitude of projects which germinated in the manufacturer minds, fully engaged in a war which turned the planet bloody during five years. The mentioned relationships also give an idea of the extraordinary background of unknown twin-boomers or bi-fuselages that were conceived from the beginning of the aeronautical era to nowadays, while helping to classify the corresponding famous models.

If, as myself, you find rather austere the approach of this book, you may nevertheless recognize some merit for its author. It was courageous to choose a research which seemed frustrating through the total absence of photographic sources – but can one take pictures of a project which did not exist? Taking moreover the risk to scan a short period completely, rather than choosing some very accessible items over a long duration. To have developed a hard work of graphic creation out of the orthodox ways. Personally, I am "proud" to have got "Forked Ghosts", because this book unquestionably enriches my own knowledge, but also my library.

Herbert LEONARD

A handwritten signature in black ink, appearing to read 'H. Leonard', written over a horizontal line.



Introduction

In the world of aviation books, twin-boomers were victims of injustice: no thematic work was devoted to them. However, the principle of morphological topics was unanimously accepted: canards, flying wings, multiplanes, seaplanes with floats or with hull, all were celebrated, gathered by family... except twin-boomers.

If one of the famous signatories among aeronautical authors had decided to fill this lack, he could have gathered in a few months a photographic catalogue illustrating the 200 families of built twin-boomers all over the world. But, while professional authors all focus on conformist subjects, amateurs have the heavy task to create the original books they would have wished to read. Without looking for profit, without claim to enrich universal Knowledge, this can be simply a nice hobby, like modellism or gardening, just as pas-time waiting to be old or die.

However it is technically uneasy to create an aeronautical work. How to get the copyright for an image from a Czechoslovakian book published 40 years ago? How to get the original photographs, without criminal cutting nor poor photocopy? These problems direct towards giving up the photographic way, and thus direct to simple drawings. From there, it is rather natural to focus on unbuilt projects, leaving to specialists the task to complete perhaps someday the subject with a photographic work covering built models.

For a book devoted to twin-boom projects, 2 ways were possible: an encyclopaedia or a personal selection. Some expansive sensitivity, trustful, would lead to a free choice of a few models declared fabulous, but an anxious-ant mind is more afraid being criticized for each voluntary omission. Without trying to reach exhaustiveness, utopian, this directed to a large and ordered catalogue, presenting numerous rare birds.

Alas, a serious problem of subject-limit appeared to be complete: departing several models from twin-boom and "multi-beams" was very difficult, among do-it-yourself machines - ancient pioneers as well as modern ultra-lights. To avoid this problem, it seemed wise to focus on some intermediate period, like the 1930s to 1970s. However, limits of decades do not correspond to any aeronautical logic, and one could smile of this absurd mixture between the mathematical rigour of a 10-base counting, with the relativism concerning the choice of Christian calendar and approximate dating of Jesus-Christ life. So it seemed better to chose one clearly definite period, between 1930 and 1980, which has a meaning for aviation: the second world war – main chronological topic by far in aeronautical books.

Thus, it is a completely unusual logic that resulted here in centering the subject over war years. This book is not a "Twin-boom Projects" chapter added to a traditionally militarist "Encyclopaedia of World-War-II airplanes", it is exactly the opposite: an essay covering "Years 1939-45" in a peaceful "Encyclopaedia of twin-boom projects" – which did not exist yet so had no rules...

Such an approach raises multiple questions, but these divagations have no interest for most of the aviation enthusiasts, and here we go with the planes themselves (the way to present them, completely abnormal, will be later discussed in debates as appendices).

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Chapter 1 : Booms on pod

The least known of the twin-boom configurations is the one where the booms are not fixed on the wing. A famous example: the Kaman Huskie, helicopter whose booms took support at the top of the nacelle. Several autogiros without wing, like the Gadfly and Glanville, also employed this formula, but during early 1940s, this layout was featured by airplane projects.

1.1 - Free fuselage

Standard case of apparatus with booms aft of a fuselage: the **Rubik R.21** glider was built as a long compartment ending in a large rear door. In order that the tail does not block this access, it was obviously necessary to employ a layout different from the traditional aeronautical fuselage, refined gradually and symmetrically towards the tail. Using two lateral booms to support the tail was an excellent compromise between solidity, lightness, aerodynamism, compared to concurrent formulas (big high single boom, lengthened ceiling, bent-upward fuselage – see the Beverley, Hercules, Caribou).

Perhaps the same layout was employed on another contemporary glider : a profile titled **Moskalyev SAM-23** (??) had booms fixed on the fuselage and not the wing, differently from the traditional SAM-23 that we will present later. The fact that the tailplanes do not extend outside the close booms is not a proof of wrong interpretation: with biplane tailplane, the surface for balance would be large enough. The principle of cargo with 2 booms not connected to wings, though unusual, was used on several recent designs: De Kellis-Olson Air Truck, Air Metal AMZ-102T, Armstrong-Whitworth AW.66, Bartini T.200, etc.



After booms as nacelle prolongation, the next situation is booms close to the nacelle's sides – a layout that was popularized by the science-fiction Thunderbirds' T-2. For the period here studied, the best example is the **SAAB RX-2**. Its divergent booms (and its inverted-V tail) avoided any contact with the hot exhaust cone from the jet engine – this concept was used again, a few decades later, on machines like the Yakovlev 141, for an engine near the centre of gravity (without rear weight), a short pipe (without power loss) and nevertheless a distant tail, very efficient. As for cargo planes, a single high boom (like on the Yak 15) was possible as well as 2 booms.

Another twin-boom jet of this time is remained very mysterious: **Westland E5/42**. Coming after the famous Vampire project, while using the same engine, this model was probably different through innovative solutions. Booms supported by the main pod instead of the wing could have been an hypothesis. With also a "nose hole" (air-intake like on the Gloster E28/39 or Yak 15), such a layout would have allowed a wing both very thin and very solid, simple to produce – as a cheap way to reach high speeds.

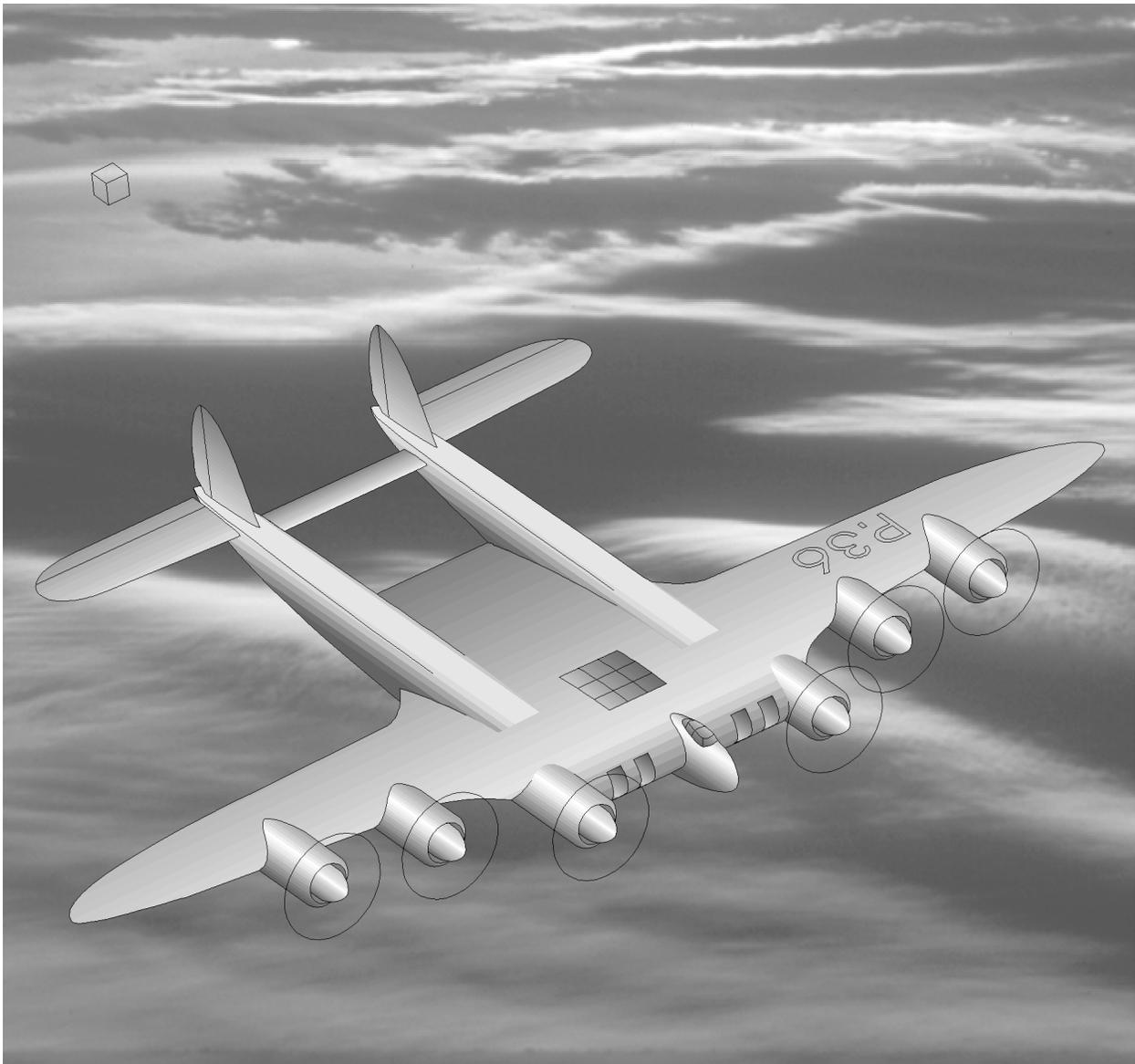
Very different, the slightly-lateral booms of the tiny **Bestetti-Nardi Sietta** (or BN-3/BN-4 Sietta) aimed at passing outside the lower parts of the propeller disc, less down than in a central position. Removing the traditional nose-propeller made it possible here to install a prone pilot, with a good view forward, minimizing frontal area (as on the Blohm und Voss Bv 40 glider). The Sietta would have reached, diving, 980 km/h (610mph), amazing speed in those years. This small machine, unable to take off by itself, was carried in altitude by a mother-plane. The Sietta's flattened booms had a step, maybe for sea alighting. Another unusual detail: the tailplane was fixed neither on the fins nor on the booms, but on little pylons – like on the BN.3 and 4 mother-planes, while it was not a Bestetti trademark, as the former twin-fuselage BN.1 had a classical tail.



1.2 – Wide Fuselage

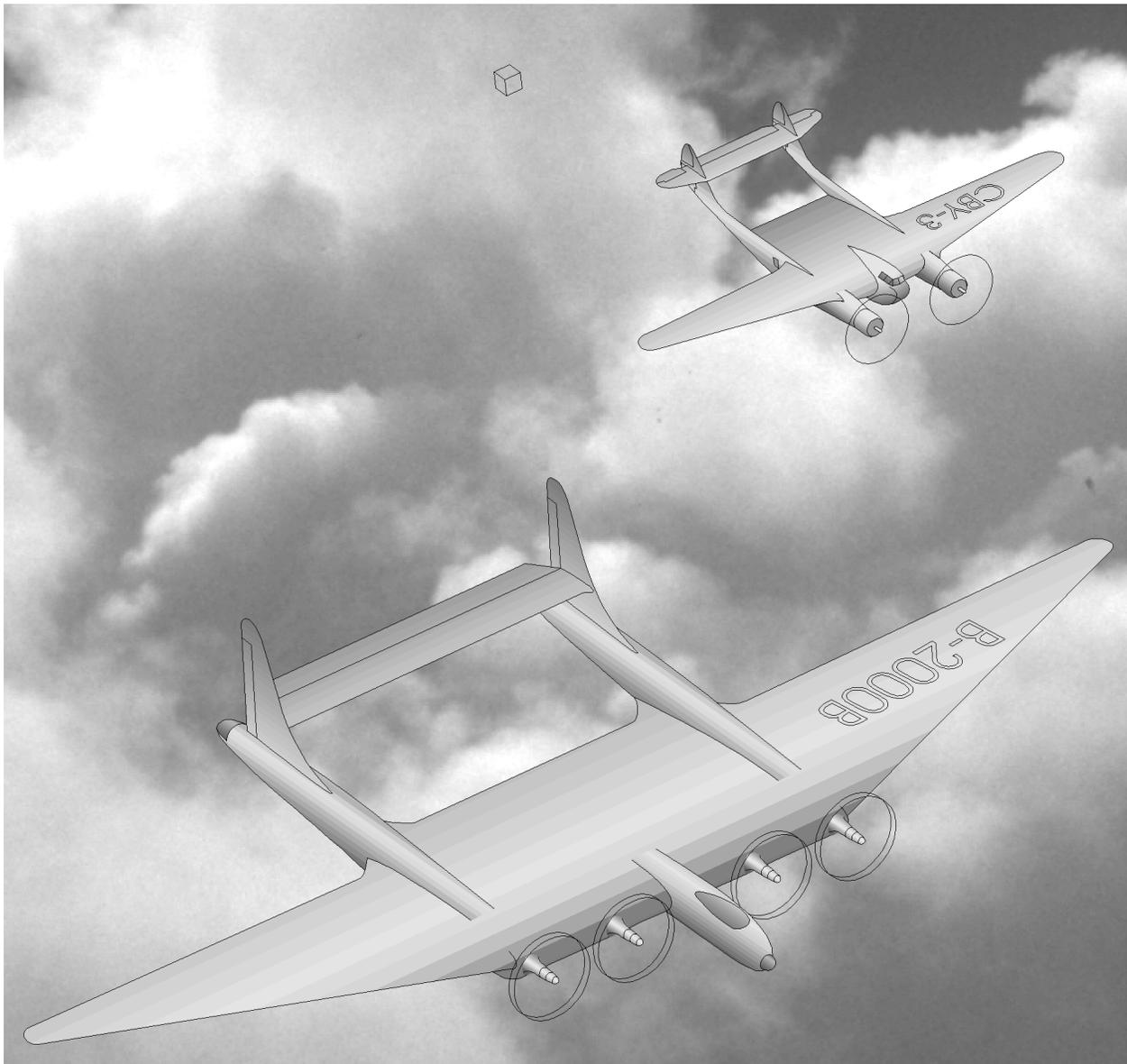
Some twin-boomers have a lifting fuselage, as illustrated by the **Percival P.36**, or its four-engined cousins **P.35** and **P.37**. All of them had a fuselage with a wing profile: short, wide, flattened below, with a thin back. Instead of being an aerodynamically trailing encumbrance, weighing in the center of the wings, the main room was thinned, to sustain itself partly. Installing the tail at the rear of such a short fuselage (as on the Remington-Burnelli RB-1) would give poor efficiency, the distance to the centre of gravity being too low; using a single central boom, there would be a choice between a fragile light tube and some obstruction by a big structure dividing the compartment in two (the contemporary Junkers Mammut used this way). Thus the twin-boom solution prolonged the sides of the fuselage, simply. By the way, note on the P.36 the very original tail, with a link between booms having no control surface; this can be explained by the bad vortexes aft of the fuselage.

Nowadays, lifting-body twin-boomers are extremely rare, the Flight Dynamics Flightsail VII being built anyway. In fact, the lifting-bodies have become able to fly without auxiliary wing nor tailplane, introducing a new class of aircraft. Some hypersonic X-planes made this family famous in the 1960s (M2-F3, HL-10, X-24A etc), and now appear similar propeller planes like the Teenie Gaviota.



The most famous designer of lifting fuselage aircraft is Vincent Burnelli. Contrary to similar old families (De Monge, Dyle and Bacalan), Burnelli planes were still up to date in the 1940s. The project Cunliffe-Owen OA-1 Mk II matches our time window, but it was only a slightly modified version of the older OA-1, itself nearly identical to the even older Burnelli UB-14B.

The very different project Canadian Car & Foundry CBY-3 (also known as Cancargo-Burnelli Loadmaster) was becoming in the early 1940s, and has been developed even after. Other creation based on Burnelli patents: C.C.F. B-2000B. This huge machine, as big as the Convair XB-36 Peacemaker, would have used 16 engines: the 12-cylinder units, similar to those propelling P-63s, were linked two to two by the engine manufacturer, then the airframe manufacturer coupled two of these super-engines to drive each group of coaxial propellers. With less thrill, one may classify this B-2000B only as a simple 4-engined plane: after all, the double-radial engines had been designed as couples of two simple radial engines, while in the mid-1940s were considered engines with up to 8 rows on the same axis, without considering this as 8 engines. Note on the B-2000B that the fuselage is not much longer than the wing-cord, and this makes a connection with the next items.



1.3 – Faired fuselage

Many streamlined planes were designed with a very short fuselage, faired in the wing, seen from below (or above). One could speak of inhabited wing (like on the LEM-2 illustrated page 80) if the fuselage had not a much bigger height, making a big difference with the wing - seen from front.

The twin-boom layout beside a faired fuselage is embodied by the glider **Bowlus MC-1**, half-scale model of the **MC-1A** or **Airborne Transport XCG-16** (more famous as **General Airborne XCG-16A Flying-Wing**). The rear booms were raising upward, freeing the tailplane from usual vortexes. This CG-16 Cargo-Glider was different from the Rubik 21 in having its door in a front position, not aft. The flattened layout provided a very reduced aerodynamic drag; thus it could be tugged by a weaker plane, or tugged at higher speed by a normal plane. According to some authors, this "Bowlus-Burnelli" XCG-16 was somehow a derivative of the twin-engine Burnelli A-1, designed before 1939. The nickname Flying Wing, like on the Northrop Avion I and similar Stadlman, focuses on the absence of traditional fuselage or nacelle; such a denomination is criticised by purists considering as flying-wings only tail-less models (like the Northrop B-2).

Other example, the **Fokker 180** employed like the contemporary CCF and Percival a small ovoid nacelle in front of the faired wide fuselage, to improve the pilot's lateral view. It was a late reduced derivative of the huge Fokker 160. A big advantage of the widened fuselage, for this transatlantic airliner, was its good stability upon water, in the event of emergency alighting (removing the wings made a perfect raft).

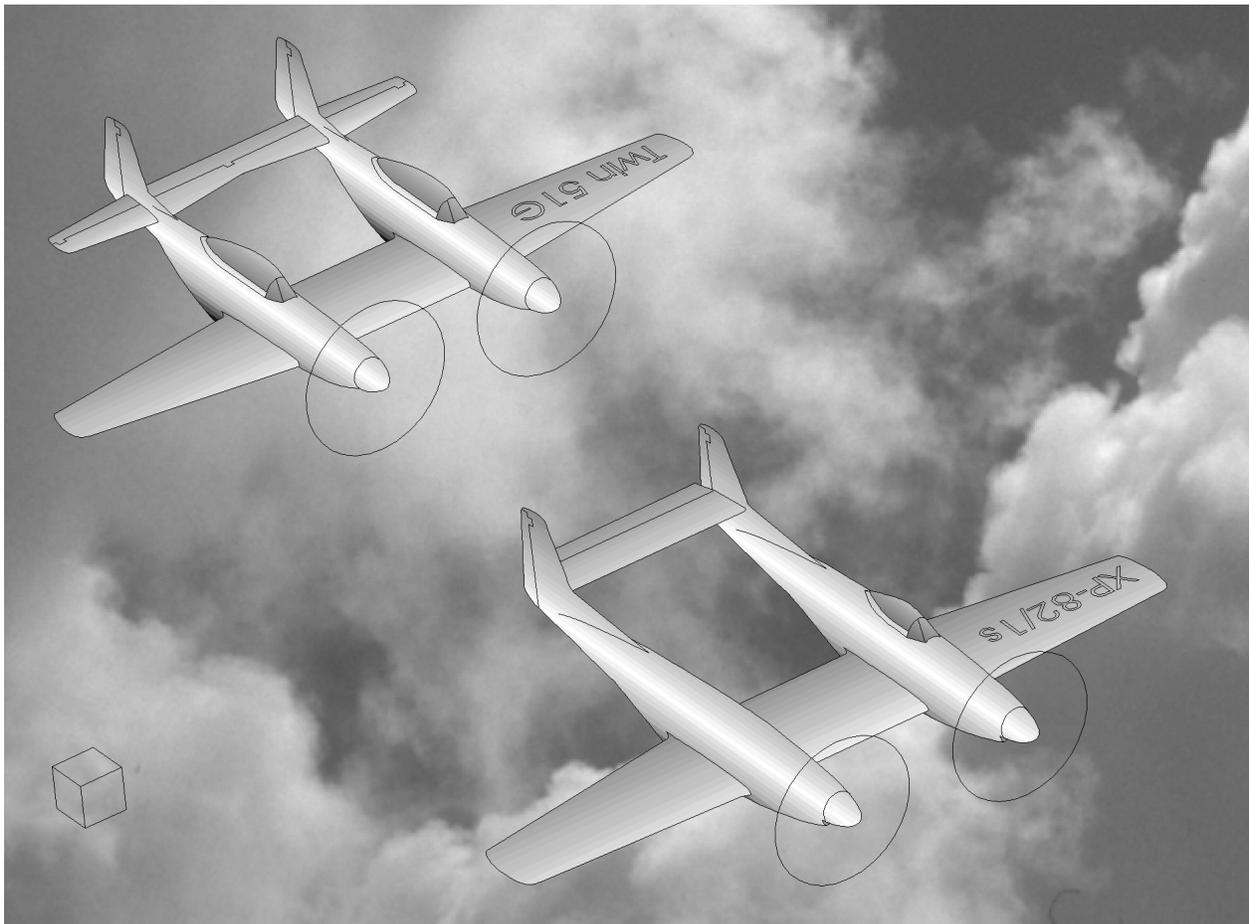


Chapter 2 : Booms without pod

The 'twin-fuselage' word has many discrepant meanings, even more than 'twin-boom' (see page 79). Arbitrarily, we will consider here as "twin-fuselage twin-boomers" the models on which 2 large lateral structures avoid the need for a central nacelle. This excludes models having both inhabited lateral fuselages and central-engines – like the old push-pull Sikorsky S.XIX and Blériot 125, or the recent single-jet Fouga Gémeaux II and Avia LE P-3.4.

2.1 – Double planes

The most famous origin of pod-less twin-boomers is linking two traditional planes, *single-boom*. According to many authors, this way started with the old biplanes Blackburn TB and Voisin O. In the period 1939-45, the usual example is the North American NA-120 Twin-Mustang (XP-82). Most known as progenitor of the later F-82, this model would be a derivative of the single-engined P-51 Mustang. To increase much range, far more gas must be carried, needing more room and weighing much more, thus twice more power to take off. The idea would then have come to join two available Mustangs, in a **Twin 51G**, or F or H – the plane being redesigned, later, lengthening the back and changing canopy, most of all. Then an asymmetrical, single-seat alternative (**XP-82/1s**) was considered. This model would have been better somehow, having less drag and weight than the traditional version P-82, but for very long flights, there would have been no more possibility of a second pilot for relieving.



The gorgeous "5" series of Latin single-seaters was also declined in double versions. Most famous of them: the **Reggiane Re 2005 Bifusoliera** (twin-fuselage). A published drawing shows a model very close to the basic Saggitario, while a display model of the manufacturer presents a quite different model, with a lengthened fuselage and a cockpit moved forward, improving visibility, stability, range. Compared to the traditional Re 2005, speed would have increased by 20%, the power being doubled while the wing drag was not fully doubled. In the same way, acceleration ability raised, weights being less increased than driving force. But the same result could have been obtained without doubling, simply truncating the wing and tail, as on some Mustang racers. The G-55 Centauro got the same evolution, into **FIAT G-58**. The rear fuselages were slightly lengthened, and the doubled fin was of reduced size. Wings of various spans were considered. The Veltro was also doubled, into **Macchi C.205 Bifusoliera**. This one was characterized by its standard tails, not linked.



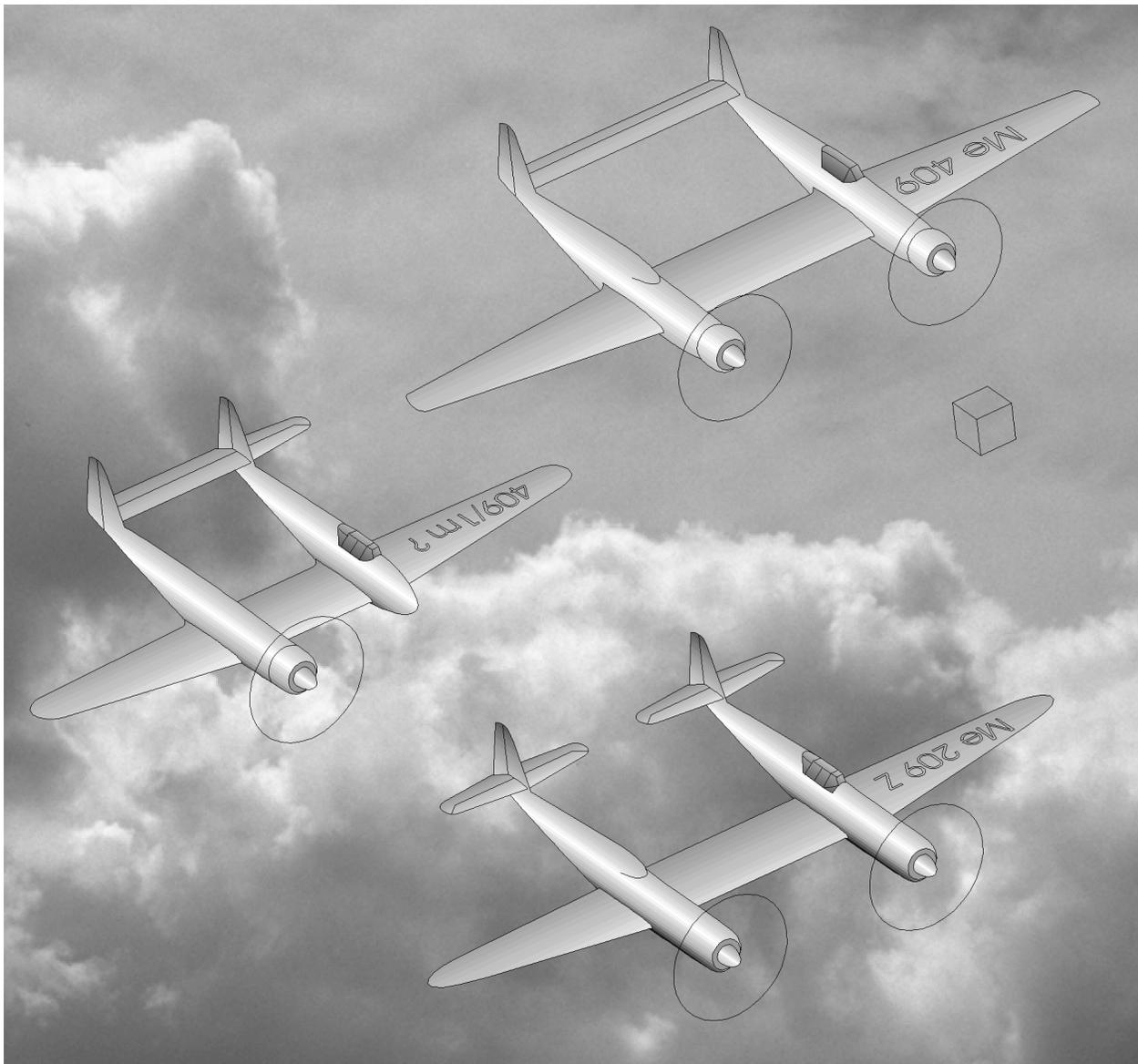
Like the P-51 and Re 2005, the very traditional Bf 109 knew projects of double-version. Many different drawings have been published. It seems that on the basis of two Bf 109F (or G) was considered the first double model: **Bayerische Flugzeugwerke Bf 109Z**. But other sources present a re-designed model (**Messerschmitt Me 109Z?**). More original, a version with separate tails could be coded **E 2-26** according to a document with pages as only reference, almost. Having the wing as only link need less new parts, simplifying manufacture and repair of the double model. On the other hand, solidity was poor. A similar layout had appeared several decades before, on the Fokker M9 (double M-8) and Voisin O (double M). This Messerschmitt E 2-26 used a nonstandard canopy, apparently two-seater but different from those employed on models Bf 109G-12, Bf 109S and CS-199.

All these models had four landing gears under the wing, which is very normally the double of the basic model, but was different from the North American/Reggiane way: only two main landing gears.



Modernized derivative of the Bf 109, the Me 209-II was also declined in double version. The most famous model is the **Messerschmitt Me 409**, associating Me 209 fuselages with bigger wings coming from the Me 155B line. As for the model 109, a version with separate tails was considered (**Me 209Z?**). The letter Z is not coming after a Y, but abbreviating the adjective "Zwilling", i.e. "Twin". All suffixes Z do not have this significance: The Do 17Z and Do 32Z were not at all twinned models – Z can also mean *Zweimotorig* or *Zweisitzer*, i.e. twin-engine or two-seater. The same trap occurred with the prefix "Twin", which indicates as well double-planes (Twin-Mustang, Twin-Hotspur, Twin-Condor, Wagner-Twin) and simple planes with doubled motorization (Twin-Courier, Twin-Porter, Twin-Navion, Twin-Bonanza). As double-planes usually have doubled motorization, mixing is natural...

One sources mention the Me 409 as a single-engined aircraft. Unless the simple modernized 209 was temporarily coded 409, that would mean an ablation of one engine was considered on the twin-fuselage Me 409 (**Me 409/1m**). As the contemporary Blohm und Voss Bv 141 illustrated the perfect viability of an asymmetric single-engined aircraft, it is possible that the engine would have been located at the level of the crew-less fuselage, rather than in an added central nacelle, with related extra drag. This hypothesis would have provided a night model with a free nose for a radar, an improved visibility forward, a great volume of fuel in the fuselages, a big range using a single engine.



Other derivative of the Bf 109, the Me 309 was also designed in a double version: **Messerschmitt Me 609**. Depending on sources, this project used fuselages more or less redesigned from the 309 basis. It seems also that a version with separate tails was considered (**Me 309Z?**). Doubling the first figure, on Me 609 and 409 (from 309 and 209) is not a general rule for double planes: the 209 was simply a 109 of second generation – the same within families like Junkers 188/288/488 (and Canadair 215/415, Bell 212/412, etc); interesting innovation, the Fouga company baptized CM.88 its double CM.8, but the Mustang 5151 (Loehle) is only a reduced-scale P-51; in the same way, the Savoia-Marchetti family reserved designations SM-55/66/77/88 to twin-hull or twin-boom, but without relation to models 5/6/7/8. Back to Messerschmitt, the Me 609 was sometimes named Me 609Z while there was no double-609 (quadruple-309) – simply, the 609 being a double plane, it deserves the Zwilling adjective: 609 (Z).

A **Me 509Z** has also been mentioned. It could be a double version of the 509, which was itself a Me 309 with front cockpit and rear engine ("P-39 way"). Nevertheless, it is also possible that the double 309 was temporarily coded "Me 509 (Z)", as fifth generation in the 109 family, before choosing designation Me 609: "second generation of Me 309", releasing the code Me 509 for a later project, not a double.

